MINISTRY OF TRANSPORTATION

RoadTalk

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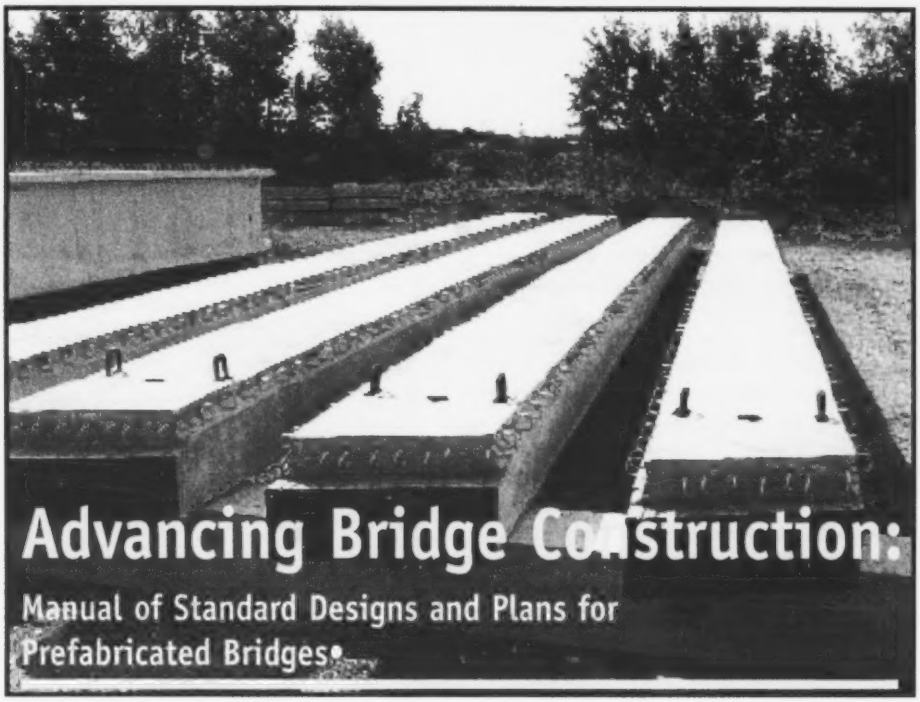

Advancing Bridge Construction:

Manual of Standard Designs and Plans for Prefabricated Bridges

Moose Creek Bridge, Hwy 101: Pre-cast Girders

The Bridge Design Standardization project is a ministry initiative to improve the quality of bridges and reduce the time required for the design and construction phases. During this project the ministry is also promoting the use of prefabricated technology.

Bridge construction is becoming more challenging, especially in congested urban areas where costs associated with traffic control have increased substantially. In the past, the ministry has used pre-cast, pre-stressed concrete bridge elements such as girders, partial deck slabs and barriers to speed up the design and construction and to reduce the disruption of traffic. Several standardized drawings and design tables have been prepared and are available to designers. The benefits of prefabrication and standardization include: improved work zone safety and bridge quality and, reduced traffic disruption, environmental impact, construction time and life-cycle costs.

Fabricating the bridge elements in a controlled environment improves quality and durability and as a result reduces the overall life-cycle cost. The efficiency of mass production of standard bridge components in a manufacturing facility will make prefabrication technology economical. On-site labour and construction time is shortened thus minimizing traffic disruption and increasing work zone safety during construction. Less on-site construction activities also reduces the impact on the environment.

The Manual of Standard Designs and Plans for Prefabricated Bridges is being prepared to

What's New

Technical information:

- 2008 MTO Highway Drainage Design Standards
  http://www.library.mto.gov.on.ca/webopac/report/8f75750b-4ee4-4900-b3a6-bedf833bb5b9.pdf
- E-sessions from 2008 TRB conference
  http://www.trb.org/conference/e-session/2008am.htm

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Road Talk est aussi disponible en français:
www.mto.gov.on.ca/french/transtek/roadtalk.

This publication reports on innovations and new technology relating to highway management; the design, construction, operation and maintenance of highway infrastructure.

Readers are encouraged to submit articles, news items and comments to
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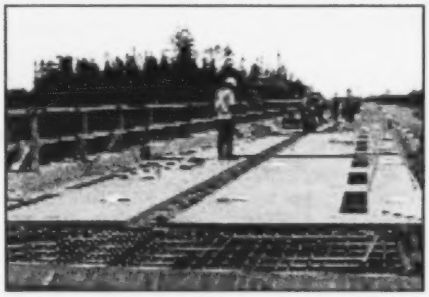
provide standardized designs and details for steel and concrete bridge girders that can be made to fit most highway configurations. With this manual, the designer will be able to select a standardized bridge design with bridge span, width and cross-sectional requirements that will closely suit the actual site conditions. The manual will be released in stages and at completion it will provide standard plans for the construction of multi-span bridges with the following types of pre-fabricated bridge elements and systems.



Little Savanne River Bridge, Hwy 17
Pre-cast full-depth deck panels.

Hwy 401/ Mull Road Underpass
Pre-cast full-depth full-width deck-panels.

- Full depth pre-cast concrete slab panels on CPCI girders
- Full depth pre-cast concrete slab panels on steel girders
- T - CPCI girders
- Composite concrete slab on steel girders
- Partial depth stay-in-place deck panels on CPCI girders
- Sub-structure components.

Although this manual is being developed to facilitate the design and construction of pre-fabricated bridges, some of the detail plans are also equally applicable to cast-in-situ type construction. When applicable, the bridge designer can utilize these plans and reduce the design effort required to prepare the contract documents avoiding the need to prepare individual drawings.

In developing the standardized designs, the following considerations are given to bridge cross-sections, span lengths, and girder spacing. Bridge cross-sections generally consist of the highway components such as barrier walls, sidewalks, side clearances, traffic lanes, auxiliary lanes and medians. The number of traffic lanes required depends on the traffic volumes. The widths of these highway components vary depending on the highway class and design speeds as stipulated in the *Geometric Design Standards for Ontario Highways*. A survey of the bridge inventory shows that the majority of bridge widths are between 10m to 16 m. The standards in this manual are developed to accommodate bridge widths varying from 10m to 30 m.

Bridge spans are determined by many factors such as highway alignments, profiles and clearances, and environmental or site constraints. For a bridge over another highway, the bridge span and number of spans would depend on the highway section, which may consist of clear recovery zones, side clearances, numbers and widths of traffic lanes, and types and widths of medians. These requirements can all be determined using the *Geometric Design Standards for Ontario Highways* and *The Roadside Safety Manual*. An inventory of ministry bridges shows that most have spans between 10m and 35m.

The standards in this manual are developed to accommodate spans varying from 10m to 45m and will use a minimum of four girders in a bridge superstructure to facilitate future staged rehabilitation.

The bridges with unique geometry or functional requirements would need to be designed on an individual basis.

Standardized systems of pre-designed bridge elements give the designer a wide range of choices for efficient application to a particular project. It enables bridge designers to put together contract packages quickly and provides the construction industry and the pre-cast industry an opportunity to fabricate bridge components for stock. A standardized system will lead to time and cost savings and enhance safety during construction. ●

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Weather Watch:
Next Generation Road Weather Information Systems (RWIS)

With its ongoing goal of proactivity rather than reactivity in analyzing and anticipating weather conditions and their effect on the province's roads, MTO uses road weather information systems (RWIS) across Ontario to provide real-time, accurate, and site-specific pavement surface conditions and weather data.

There are currently 114 RWIS stations across Ontario that use specialized equipment and computer programs to forecast, obtain radar data, report on local road conditions and detect road surface temperature. A number of next generation technologies have opened the door for MTO to improve its current RWIS stations. Some of these RWIS innovations are already in trial throughout the province.

RWIS stations provide information including ambient air temperature, relative humidity, wind speed and direction, precipitation, and a number of other climatic conditions. Individual RWIS sites are usually made up of several atmospheric sensors mounted to a tower, with sensors embedded within and below the pavement surface. All of these sensors are connected to communications equipment and a data processing unit, which relay information to a forecasting service. RWIS stations transmit weather and pavement surface information every 20 minutes, and provide spot-forecasts up to 48 hours in advance.

Next generation RWIS incorporates three functional aspects: current information, forecast information and outcome information. One prototype overlays weather observations and forecasts with current or planned maintenance activity to predict the future road surface condition. It integrates the weather forecast with GIS (Geographic Information System) and GPS (Global Positioning System). MTO has also begun to evaluate Maintenance Decision Support Systems (MDSS) for implementation into Ontario's RWIS stations. These innovative systems should help to diagnose, detect and display weather information, road condition information, and winter maintenance treatment recommendations.

MDSS incorporates GPS, as well as vehicle, traffic, meteorological data and geographical data to provide predictions for temperature, snow depth, blowing snow potential, pavement frost potential and road mobility. MDSS should also create route-based thermal maps, rank and highlight areas of concern and provide suggestions given multiple treatment options. Users should then be able to evaluate the results of multiple treatment options by way of 'what if' scenarios.

Real-time data is used for short term forecasting purposes. This has been termed 'nowcasting'. Ideally, personnel with basic training in weather patterns and local conditions are able to employ nowcasting to improve the overall effectiveness of a winter maintenance program. Typically RWIS data can be used to generate hourly nowcasting to predict the upcoming weather and pavement conditions.

Other technology is constantly being investigated for its potential incorporation into MTO's RWIS arsenal. In 2007, for example, MTO tested a pair of remote optical sensors for road surface conditions monitoring. The Vaisala Remote Road Surface State Sensor (DSC111) and Vaisala Remote Road Surface Temperature Sensor (DST111) were deployed for one winter on the eastbound lanes of Highway 417 near Casselman. This evaluation is being done in partnership with AURORA which is an international technology development partnership of public agencies who cooperate in road weather information systems (RWIS) research activities.

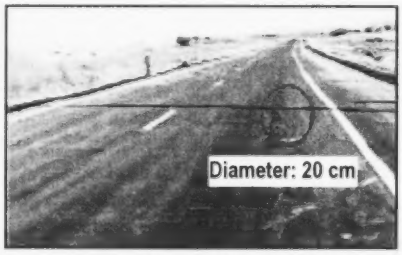

Figure 2: An area that is monitored by an RWIS sensor.

The DSC111 is an active near-infrared band remote sensor, which sends infrared light beams to the road surface and measures the reflection of the signals. Based on observed differences between the emitted and reflected signal, it can determine the surface state, classifying it as dry, moist, wet, icy, snowy/frosty, or slushy. The DST111 is a temperature sensor based on infrared technology. It measures the difference of long wave infrared radiations between the sensor instrument itself and the road surface. This difference can be calibrated to a known temperature and thus used to estimate pavement temperature.

Single season trials determined that while some systematic differences were found between the Vaisala products and in-situ pavement sensors in determining road surface temperature, Vaisala sensors were 96% accurate in determining road surface conditions through matching recorded with reported road conditions.

Road weather information systems are a vital component of MTO's winter maintenance toolkit. As such, MTO is contantly seeking improvements to its processes and technology, in order to accurately monitor road conditions and keep Ontario's drivers safe. •

For more information, please contact Max Perchanok, Research Coordinator, Highway Standards Branch, at (416)235-4680 or at Max.Perchanok@ontario.ca.


Figure 1. A next generation RWIS sensor is used to detect road weather surface conditions.

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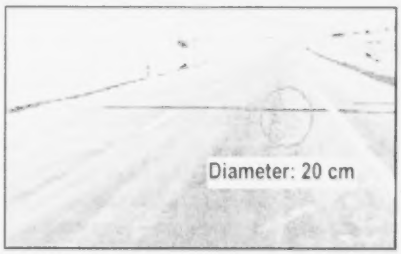


Figure 2: An area that is monitored by an RWIS sensor.

Figure 1: A next generation RWIS sensor is used to detect road weather surface conditions.

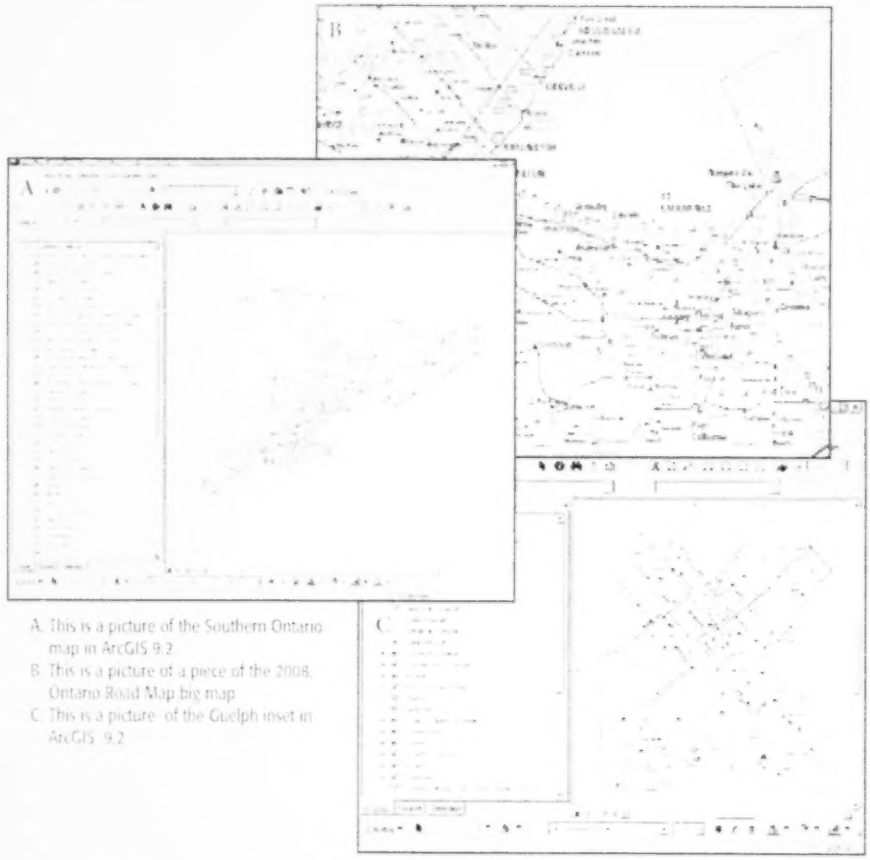
Modernizing The Ontario Road Map

Modern updates to the Ontario Road Map, first published in 1923, are just one demonstration of the commitment that MTO has made toward integrating advanced technology into its everyday operations. The 2008 update of the map is no exception, making use of the latest in geographic information system (GIS) software to deliver a more accurate and more efficiently developed version of the Official Road Map of Ontario.

MTO updates the Ontario Road Map every two years; 1997 marked the first year in which digital computer technology was used for its production. Cartographers used specialized map publishing software to design the document, add symbols, manipulate linestyles, perform editing functions, and generate digital files which were then delivered to a printing contractor for the map's final production. Since then, the overall process has remained broadly similar, but small changes are constantly being made to take advantage of the latest advances in computer mapping technology.

Development of the map is done cooperatively between MTO and the Ministry of Tourism. For the 2008 map, Ontario's Ministry of Natural Resources (MNR) Provincial Geomatics Services Centre (PGSC) was contracted on a one-time basis so that the map could be created in ESRI's ArcGIS 9.2. ArcGIS is an integrated suite of GIS software that allows for precision and extensive streamlining of the map-making process. In the future, maps will be maintained by MTO, recreated from existing ArcGIS data.

Traditionally, the Ontario Road Map and MTO's GIS records have been maintained separately, requiring multiple updates for the integration of new data. MNR's integration of the map with ArcGIS, however, will allow MTO to use its GIS data to drive map creation, thus eliminating redundancy. Additionally, ArcGIS gives MTO the ability to create custom maps using the current Ontario



A. This is a picture of the Southern Ontario map in ArcGIS 9.2.
B. This is a picture of a piece of the 2008 Ontario Road Map big map.
C. This is a picture of the Guelph inset in ArcGIS 9.2.

Road Map as a base, where layers can easily be turned on or off. The most recent version of ArcGIS also provides for improved symbol functionality, and cartographic representation, so that core data isn't modified when minor cosmetic changes are made to the map.

In the first step, cartographers prepared a pilot project using a small test area of the provincial map. This allowed MNR to flush out issues with the software and updates, and obtain a better understanding of the work that would be involved in preparing the finished project.

Next, the cartographers made adjustments to the GIS data. Some layers required more upgrades than others, including drainage (lakes and rivers), built-up areas, and municipal boundaries. The team then created two maps - one for Northern Ontario, and one for Southern Ontario - to be exactly the same as the previous (2006) version of the Ontario Road Map.

The next step involved compiling the updates for 2008. Requests for updated information were made to information sources during the year leading up to the map's printing. MTO compiled these updates and sent them to MNR to update the road maps for Northern and Southern Ontario. Once the final output was produced, the finished map was exported to Adobe Illustrator, where its final layout could be adjusted.

The finished Ontario Road Map was delivered in multiple digital formats: PDF, Adobe Illustrator files, and an ArcGIS Geodatabase. Final changes were made to the map by MTO and a printer was contracted to carry out the printing process. More than 810,000 copies of the Ontario Road Map are printed in production years. Ontario's Ministry of Tourism receives 800,000 copies for free distribution at Provincial Travel Information Centres, while another 10,000 are retained by MTO for sale through Publication Ontario Online (POOL) at $2.95 per single copy (with reduced prices for bulk purchase). Reprints are made at the request of the

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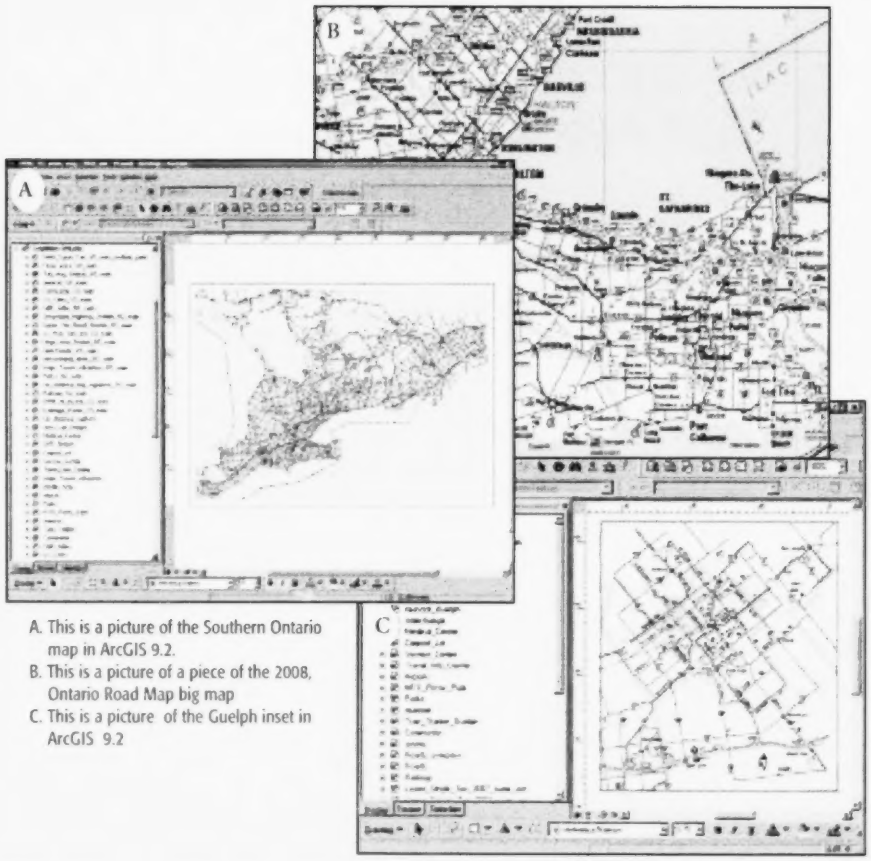

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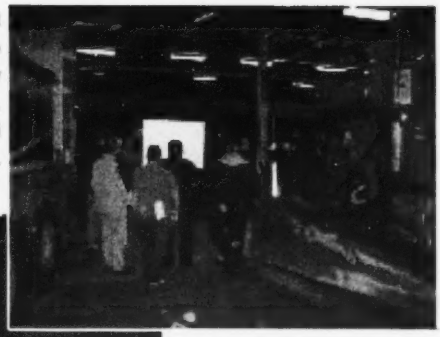
MTO Hosts Winter Maintenence Technology Open House



The Ontario Provincial Police were also on hand to demonstrate the technology that they use year-round, including breathalysers and traffic enforcement cameras.

Participants from across the province gathered to view and participate in a series of interactive presentations on MTO's winter maintenance operations.

As part of its commitment to the constant development of its winter maintenance toolkit, MTO held its annual Maintenance Technology Project Open House on March 5, 2008 in North Bay. The Open House, like those held in years past, provided an opportunity for participants to view the cutting-edge technology, materials, equipment, and best practices for winter operations that contribute to MTO and the Maintenance Technology Project's vision of ensuring that Ontario is an effective, efficient, and environmentally conscious highway maintenance leader.

Through partnerships between head office and regional offices, product manufacturers, vendors, and maintenance contractors, the Maintenance Technology Project aims to achieve a number of strategic goals, including:

- Protecting the environment by reducing salt usage.
- Moving away from methods-based specifications.
- Improving operational and contract oversight.
- Moving towards outcome measuring and reporting.

While appropriate winter weather was the story outside, maintenance officers and MTO contractors inside delivered a series of engaging presentations on some of the newest additions to the ministry's winter maintenance toolkit. Participants from across the province gathered to view and participate in a series of interactive presentations on topics ranging from MTO's use of RWIS to determine spring load restrictions, and salt management and material storage handling at patrol yards, to direct-liquid application anti-icing, hot water sanding, the tow plow, and the two-stage plow.

As part of the open house, the Ontario Provincial Police were also on hand to demonstrate the technology that they use to keep the province's roads safe year-round, including breathalysers and traffic enforcement cameras, while RWIS contractor AMEC was available to show off advancements in its own software.

The open house included a presentation by MTO's Adrian Tessier, on the ministry's initial tests of hot water sanding. The presentation included the presence of an actual hot water sanding unit, built by the Swedish company Friggeråker Verkstäder AB. Developer Christer Friggeråker was present to provide a parking lot demonstration of the truck's capabilities. The hot water sander has the surface appearance of a traditional salt spreading truck, but is equipped with a water tank and a hot water boiler to allow the mixing of fine sand with hot water. As the mixture is distributed onto the road, the material melts down into the hot water as it freezes, creating a coarse surface layer with the appearance of concrete. Because the sand freezes into the mixture, plows and traffic don't remove it.

Meanwhile, MTO contractor Pioneer Construction delivered a presentation on its use of direct liquid application (DLA), the application of liquid brine directly to road surfaces before the occurrence of a winter event. Pioneer sees DLA as a proactive approach toward winter maintenance that prevents frost and ice from forming and prevents snow from bonding to road surfaces.

Another MTO contractor, Steed and Evans, gave a presentation on its use of salt management techniques, and Viking-Cives' Gerald Simpson gave introductions to its tow plow and two-stage plow products.

For more information on some of the topics discussed at the 2008 Winter Maintenance Project Open House, as well as other maintenance innovations being incorporated into MTO's winter toolkit, see the article 'Gearing Up For Winter' in the Winter 2008 issue of Road Talk.

"I have been doing these open houses for years, but none has been as successful or well-attended as this one," said MTO Research Coordinator Max Perchanok, sentiments that were echoed by all those who participated. Presenters were thoughtful and informative, and maintenance contractors readily shared their own unique experiences, contributing to what was an enjoyable, effective, and informative province-wide knowledge transfer session between the public and the private sectors.

MTO is always looking for new technologies, tools, and methods to improve winter maintenance operations, and the Maintenance Technology Project's annual Open House will help ensure that the province's highways are as clear and safe as possible during inclement winter weather. •

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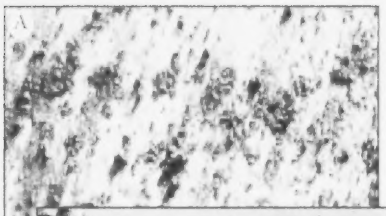
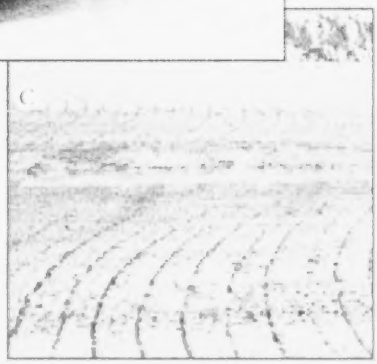
Making Sand Last: MTO Tests Hot Water Sander





A & C: Sand particles melt down into the snow and freeze on the road, creating patterns of sandpaper-like texture on the road surface.
B: The hot water sander design uses a modified version of a traditional salt spreading truck.

An important component of MTO's winter maintenance toolkit is knowing when to stand on the shoulders of giants, by learning lessons and taking cues from other jurisdictions. MTO continually seeks to apply the successful technological advances that have been made around the world in combating winter road nuisances. An excellent example is hot water sanding, a technique that was originally developed in Sweden by Friggeråker Verkstäder AB.

Hot water sanding works on the same principle as traditional sanding, by providing traction on roads and highways where snow compacting is an issue. Traditionally applied sand is quickly dispersed by the flow of traffic, and must be constantly reapplied. Hot water sanding seeks to solve this problem by allowing for one long-lasting and effective application of sand to roads. Hot water sanding works by mixing dry sand with hot water. When sand particles are released from the spreader, they melt down into the snow and freeze on the road, creating patterns of sandpaper-like texture on the road surface.

The hot water sander design uses a modified version of a traditional salt spreading truck, equipped with an insulated cold-water tank and a hot water boiler. An auger feeds sand into a mixer, where it is combined with the hot water, and then dispersed onto the road through the spinner. The hot water sander uses 0-4 mm sand, with approximately 20% of the sand smaller than 0.025 mm. It disperses approximately 100-200g/m^2 of material at speeds of 20-25 km/h, with a maximum breadth of 3 m, and employs water as hot as 95 degrees celsius.

Scandinavian studies have demonstrated the efficacy of hot water sanding at providing a higher coefficient of friction - and therefore better traction - on roads than standard sanding, and lasting longer than traditional sanding. However, MTO is currently performing its own tests on the design, to ensure its applicability to Ontario's winter maintenance procedures. The hot water sander was tested in Savant Lake with the assistance of its designer, Christer Friggeråker. The preliminary results from this testing were encouraging. Testing showed that the hot water sander functioned as intended: the sand melted down into the snow - by as much as 5-6 mm - before freezing on the road, creating a highly frictional surface that is largely unaffected by the movement of plows or traffic overtop.

Widespread implementation of hot water sanding is currently li d by a few minor challenges. The sander's design currently has problems with rear visibility, in the form of a cloud of steam that is caused by the hot water and the truck exhaust. Another concern is whether there will be enough water to operate the hot water sander in communities that rely strictly on well water.

Nevertheless, hot water sanding has a number of likely benefits. In Savant Lake alone, the annual average sand use is 7,400 tonnes. Current estimates are that the effective integration of hot water sanding into the region's maintenance toolkit could possibly reduce sand use by as much as 25%, corresponding to a realized decrease of 1850 tonnes of sand. Additionally, the material used in hot water sanding requires no salt, and could therefore also save as much as 74 tonnes of salt per year. This potentially translates into a reduced environmental footprint and improved driver safety on the province's snow compacted roads. After initial tests in Savant Lake, MTO's hot water sander spent the past winter in North Bay.

After undergoing minor modifications, the hot water sander is tentatively scheduled to return to Savant Lake for a full season of winter testing. MTO will use this opportunity to compile formal data on hot water sanding, including material and dollar savings. Early reports of success, however, suggest that hot water sanding will be another valuable addition in the ministry's fight against the ills of winter weather on Ontario's highways. ●

For more information, contact Max Perchanok, Research Coordinator, Highway Standards Branch, at (416) 235-4080 or Max.Perchanok@ontario.ca.

Slurry Seal on Surface Treated Highways

The Ministry of Transportation has a significant network of surface treated highway sections, with 1,915 km in Northeastern Region alone. Surface treatments are constructed by separate applications of emulsified asphalt and dense graded aggregate. Surface treatment has a coarser texture and is less durable then asphalt pavement.

Each year MTO receives public requests to upgrade surface treatment highways to asphalt. However, upgrading these highways to asphalt typically requires costly improvements to drainage, granular base, and in some cases the highway geometrics.

In a trial effort to address the public requests without the expense of upgrading to asphalt pavement, Northeastern Region applied OPSS 337 slurry seal over sections of surface treatment in the summer of 2007. Slurry seal is a mixture of emulsified asphalt, aggregate, water, and additives, and is spread on the roadway in a single pass. This was the first application of slurry seal over surface treatment by the ministry.

Slurry seal was placed over 2 km sections of Highways 559, 7182, and 520, and a 12 km section of Highway 518, all in Huntsville area. Traffic on these highways ranges from 2100 (Highway 559) to 250 (Highway 7182) daily vehicles. The cost of slurry seal placement is in the range of $15,000-$18,000/km ($1.75-$2.00/m^2).

Placement is by a special paver attached to delivery trucks when they arrive at the site (Figure 1). Water is sprayed on the existing surface from the truck as placement progresses. An auger distributes the material to facilitate an even application. The slurry seal is mixed on the truck and adjusted by the operator as required to achieve the desired consistency.

One loaded truck has sufficient material for a 400 to 700 m long by 4.2 m wide placement. Traffic was reduced to one lane during application of the slurry seal, but was permitted on the surface 15 minutes following the application during warm weather and up to one hour during cool damp weather.

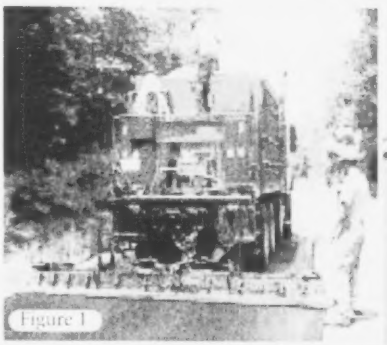


Figure 1

Figure 2

Figure 1: Placement of slurry seal by truck mounted paver.

Figure 2: Slurry Seal finished appearance

The resulting surface was uniform in appearance with slight longitudinal grooves, no loose aggregate particles, free of cracks, and a texture and appearance similar to hot mix asphalt (Figure 2).

The only distress observed to date has been minor spalling on Highway 559. Otherwise, there has been no change in the condition of the surface. The application has been successful in reducing tire noise, dust, and vehicle damage due to loose aggregate.

The performance of the slurry seal will continue to be monitored along with skid resistance testing. If performance monitoring demonstrates cost effectiveness and durability, the slurry seal applications could extended to other surface treated highway sections. •

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Reader Response

Please help Road Talk become more effective

Send us any ideas, comments, or suggestions concerning local innovations, workshops, or seminars that you would like to see included in future issues.

Road Talk is also available in French.

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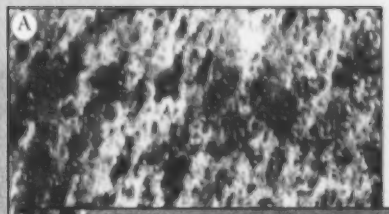
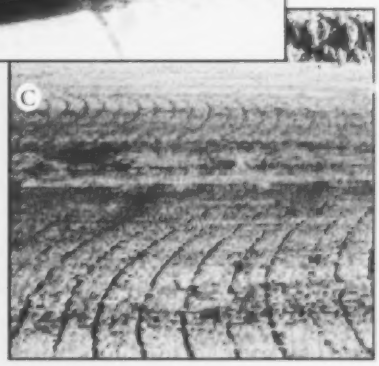
Making Sand Last: MTO Tests Hot Water Sander





A & C: Sand particles melt down into the snow and freeze on the road, creating patterns of sandpaper-like texture on the road surface

B: The hot water sander design uses a modified version of a traditional salt spreading truck.

An important component of MTO's winter maintenance toolkit is knowing when to stand on the shoulders of giants, by learning lessons and taking cues from other jurisdictions. MTO continually seeks to apply the successful technological advances that have been made around the world in combating winter road nuisances. An excellent example is hot water sanding, a technique that was originally developed in Sweden by Friggeråker Verkstäder AB.

Hot water sanding works on the same principle as traditional sanding, by providing traction on roads and highways where snow compacting is an issue. Traditionally applied sand is quickly dispersed by the flow of traffic, and must be constantly reapplied. Hot water sanding seeks to solve this problem by allowing for one long-lasting and effective application of sand to roads. Hot water sanding works by mixing dry sand with hot water. When sand particles are released from the spreader, they melt down into the snow and freeze on the road, creating patterns of sandpaper-like texture on the road surface.

The hot water sander design uses a modified version of a traditional salt spreading truck, equipped with an insulated cold-water tank and a hot water boiler. An auger feeds sand into a mixer, where it is combined with the hot water, and then dispersed onto the road through the spinner. The hot water sander uses 0-4 mm sand, with approximately 20% of the sand smaller than 0.025 mm. It disperses approximately 100-200g/m^2 of material at speeds of 20-25 km/h, with a maximum breadth of 3 m, and employs water as hot as 95 degrees celsius.

Scandinavian studies have demonstrated the efficacy of hot water sanding at providing a higher coefficient of friction - and therefore better traction - on roads than standard sanding, and lasting longer than traditional sanding. However, MTO is currently performing its own tests on the design, to ensure its applicability to Ontario's winter maintenance procedures. The hot water sander was tested in Savant Lake with the assistance of its designer, Christer Friggeråker. The preliminary results from this testing were encouraging. Testing showed that the hot water sander functioned as intended: the sand melted down into the snow - by as much as 5-6 mm - before freezing on the road, creating a highly frictional surface that is largely unaffected by the movement of plows or traffic overtop.

Widespread implementation of hot water sanding is currently limited by a few minor challenges. The sander's design currently has problems with rear visibility, in the form of a cloud of steam that is caused by the hot water and the truck exhaust. Another concern is whether there will be enough water to operate the hot water sander in communities that rely strictly on well water.

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Read All About It!

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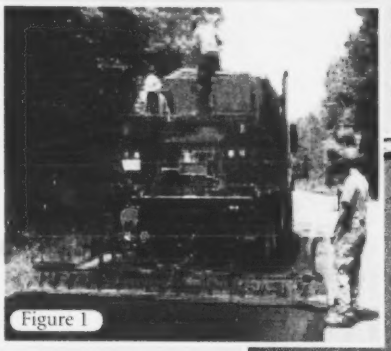

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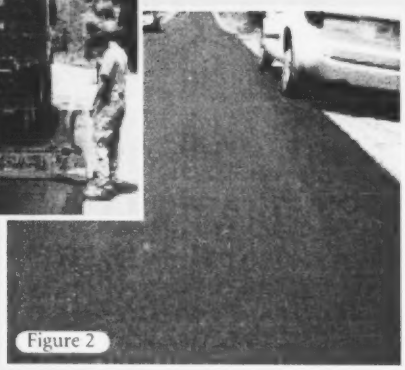

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For more information, contact Dale Smith, Head, Geotechnical Section, Northeastern Region, at (705) 497-5478 or I.Dale.Smith@ontario.ca, *or Robert Long, Pavement Design and Evaluation Officer, Northeastern Region, at (705) 497-5427 or* Robert.Long@ontario.ca.

Reader Response

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Continued...

Modernizing The Ontario Road Map

Ministry of Tourism. The Official Road Map of Ontario is also accessible online from MTO's web portal, at http://www.mto.gov.on.ca/english/traveller/map/, where it is amongst the ministry's most popular pages.

As the evolution of the Ontario Road Map continues, its importance as a multi-thematic cartographic display will also grow - as will its incorporation of the newest innovations in GIS and mapmaking software. With a recurring press run of over 800,000 copies the Official Road Map of Ontario is a high-profile publication that both serves the varied purposes of its users and demonstrates MTO's commitment to innovation. ●

For more information, contact Bryan Simmons, Cartographic Technologist, Highway Standards Branch, at (905) 704-2316 or Bryan.Simmons@ontario.ca.

Upcoming Conference Information

Transportation Association of Canada (TAC) Annual Conference Exhibition
September 21-24, 2008
Toronto, Ontario
(for volunteer opportunities please visit:
http://portal.mto.ad.gov.on.ca/sites/MTO/PHM/tac/default.aspx)

North Atlantic Transportation Planning Officials (NATPO) Conference
August 10-12, 2008
Queens Landing,
Niagara-on-the-Lake, Ontario
(please visit: www.natpo.ca)

OTC Parking Workshop & Supplier Showcase
September 14-16, 2008
Stratford, London
(please visit: www.otc.org)